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ABSTRACT

A study attempted to specify a set of attributes of innovations and explore the extent to which these attributes have general utility in accounting for acceptance of innovations. It was hypothesized that (1) it should be possible to select the best predictors of acceptance of innovations from among the set of attribute variables and (2) attributes will tend to cluster and allow for categorization under specific factor headings. Subjects were 337 teachers (K-13) in five large urban systems. Information concerning perceived attitudes toward 18 different innovations (related to the teaching-learning process and school organization) were collected using a five-point Likert-type rating scale consisting of 16 attribute items representing the independent variables and two dependent variables (acceptance and experience). Principal component analysis and a multiple regression program were utilized to derive the best predictors. Hypothesis 1 was accepted; Hypothesis 2 was generally supported. Conclusions: Attributes accruing to innovations are perhaps as relevant to implementation of innovations as are external factors-how a teacher perceives a new idea or thing being as important as the thing or idea itself. Innovation appears initially to be a mental process followed by a physical act of implementation. Implications are noted for change theory, for practice, and for research. (JS)

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Attributes of Innovations as Factors in Diffusion

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INTRODUCTION

A majority of the studies which deal with the process of change have been constituted to explore the assumption that external factors provide the major basis for change. In these studies variables concerned with the personal, social, or situational conditions are dealt with independently or collectively. These variables in turn are correlated with rates of adoption and diffusion to provide some kind of index of innovation.

The two research traditions which have probably contributed the most to the study of the process of change in education are rural sociology and social psychology. This is exemplified in the studies of Kurt Lewin (1962), Lippitt, Watson, and Westley (1958), Rogers (1962), Lionberger (1964), Miles (1964), and Bennis, Benne, and Chin (1969). These works provide us with an overview of the range of study done on diffusion research. This range includes characterization and categorization of adopters, channels of communication, differential diffusion rates, advocacy, and to a lesser degree characteristics of innovations. These models have important implications for the study of educational change and indeed have contributed a great deal to this study, but have tended to put restrictive emphasis on the external variables that are operative in a formal organization.

It may be argued that the individuals who must finally act to implement change are often the teachers in the classroom: they are the ones who must accommodate change in a functional manner.

Miles (1965 p. 12) suggests that studies that assume that the major impetus for change in any system is generated outside the system suffer somewhat from a "great man" tendency, and that not enough attention is being paid to internal organizational factors. (Miles, 1964 p. 635) further supports this attitude when he states,

> . . . educational innovations are almost never installed on their merits. Characteristics of the local system, of the innovating person or group, and of other relevant groups often outweigh the impact of what the innovation is. . . Yet it does seem likely that some properties of the innovation itself are likely to affect its adoption and use.

Therefore it may be argued that the literature reveals a lack of general concern for internal factors accruing to innovations. The findings reported in this study are part of a much larger study which focused specifically on such internal factors. (Clinton, 1970).

THE PROBLEM

The general problem is to specify a set of attributes of innovations and explore the extent to which these attributes have general utility in accounting for acceptance of innovations.

BACKGROUND TO THE PROBLEM

Ginzberg and Reilley (1964) state that unless a plan for change is sensitive to unique elements in the change process, both in design

> The reception given to a new idea is not so fortuitous and unpredictable as it sometimes appears to be. The character of the idea is itself an important determinant. (Barnett, 1953, p. 313).

THE THEORY

The major theory for this study was drawn from existing related literature.

This review deals in turn with the topics of: (1) perception as it relates to things or ideas; (2) attributes of innovations; (3) the awareness stage of the adoption process; and, (4) the concept of acceptance.

Perception as It Relates to Things or Ideas

> The concept of perception is a key dimension in understanding the diffusion of ideas. Although a new idea may be regarded as advantageous by experts in some field, a particular actor may not perceive the innovation in a similar manner. Perception is the way in which an individual responds to any sense or impression which he detects. (Rogers, 1962, p. 303).

It is generally an accepted fact that perceiving is now considered as part of all conscious behaviour and is recognized as the first step in any learning act (Smith, 1969, p. 57). In this context perception is thought of as intake. To perceive means to recognize, to acknowledge, to interpret, to be aware of, to identify with, to associate. Bruner (1958) suggests that perceiving an object or event is an act of mentally categorizing and that the categories

and in implication, planned change will flounder. Rogers (1962, p. 306) through his general theory of diffusion and adoption of innovations has identified many of these unique elements referred to by Ginzberg and Reilley.

Rogers' paradigm (1962, p. 306) of the adoption of an innovation by an individual contains three major divisions: (1) antecedents, (2) process, and (3) results. The concern of this study will be with the internal aspects of process, namely, the perceived characteristics* of innovation. It doesn't appear to matter whether or not an innovation is in fact better or worse than the idea of the thing it replaces. What does seem to matter is whether or not the individual perceives it to be better or worse. Rogers (1962) when comparing profitability, rate of adoption, and interaction effect for hybrid seed corn came to the conclusion ". . . that profitability is not related to rate of adoption, but that the interaction effect is." He further states that, "This finding suggests it is not objective profitability but rather the adopter's perception of profitability that determines rate of adoption."

*For purposes of this study, the terms characteristics and attributes will be used interchangeably.

into which objects and events are sorted for identification are learned through experience in a particular culture and linguistic community, or are developed to meet personal needs. Events are placed into categories in response to certain cues, and the process of responding to the cues is also learned and validated by experience.

Cantril (1957) suggests three major emphases in the study of perception which enlarges on Bruner's idea of categorization. First, our perceptions depend in large part on the assumptions we bring to a particular occasion; second, they are learned in terms of our purposes; and third, they are largely a matter of weighing probabilities concerning the significance or meaning of the world "out there."

Because our world, physical and social, is not static and because an infinite variety and confusion of stimuli intrudes itself upon us, we attempt to impose a structure upon them. To combat uncertainty and so that we can predict the significance or meaning of various sensory cues we create constancies. We select from the various stimuli in terms of our assumptions, and we give meaning to what we select in terms of our assumptions, and we give meaning to what we select in terms of our needs and purposes. Thus what we perceive is in large measure what we create.

Leibowitz (1965, p. 3) feels it is not unreasonable to assume that one of the goals and purposes of perception is to stabilize our awareness of the world about us in the interest of successful adjustment.

On perceptual selectivity, he explains (1965 , p. 28) how one can select from among a variety of stimuli those which one "chooses" to permit to enter awareness. This selective process is not confined to stimulation of the sense organs. One can also think about events that have taken place in the past or that may take place in the future. Selective perception determines what we are aware of at the moment.

As Enrs (1966 p.25) states, "Almost everything an individual does, he does in response to his perception of the situation in which he finds himself."

Attributes of Innovations

> The characteristics of an innovation have a great deal to do with its rate of adoption. It is the characteristic of a new product not as seen by experts but as perceived by the potential adopters that really matters (Rogers, 1962, p. 123).

Rogers emphasizes the point by citing Wassen (1960 pages 52-56) who utilized several case examples to show that the ease or difficulty of introduction of ideas " ... depend basically on the nature of the 'new' in the new product--the new as the customer views the bundle of services he perceives in the newborn." Rogers, (1960, p. 122) further supports his premise by citing the case of The Pill that Failed. Because of the rate Americans were taking analgesics, a group of business men reasoned that an analgesic that could be taken without water would have a ready market. Furthermore, they reasoned that a combination pain killer and stomach sweetner would be that much better.

The advertising boosted the new product as a combination analgesic-antacid that "works without water." Tests showed that the ads had strong impact, the package was well designed, the price was right and dealers were enthusiastic. Despite all the preparations, the new product failed. After much probing to determine the reason for failure, it was concluded that the fatal flaw was the "works without water" feature. The concensus was that headache sufferers unconsciously associate water with a cure and consequently had no confidence in a tablet that dissolved in the mouth. It therefore would appear that consumers did not perceive the new product as compatible with their existing value on the importance of water as part of a headache cure.

In recent time social scientists have provided us with both ethnographic and theoretical works to try and explain the problems of sociocultural change. Much of the data is contained hidden within the predominately descriptive mass of anthropological writings. Kushner et al[1] have extricated much in the way of generalizations about change and behavioral regularities from these works. The result is an inventory of past work and a suggestive guide to work still undone.

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[1]The writer is indebted to an excellent review in Kushner et al. (1962) for information concerning early sociocultural studies by social scientists.

Kushner et al. (1962, p. 1) summarize their findings:

1. Students of sociocultural change look at change from a variety of viewpoints and for a number of reasons.

(a) They stress, for instance, the problem of why particular innovations are accepted or rejected--at one time, in terms of the characteristics of the innovation itself and at another time, in terms of the community involved.

(b) They examine the dynamics of the general change situations focusing perhaps on the reinterpretation of innovations, on secondary change, on the individual in change, or on the techniques which underlie successful innovation.

2. Field workers, it was found, have attacked not one problem, but many, and have approached change from all sides.

Kushner et al. (1962) among other things determined that students of social cultural change give relevance to the study of why particular innovations are accepted or rejected in terms of the characteristics of the innovation. They suggest that stressing the innovation itself one may see the key to acceptance or rejection in such characteristics as congruence to or compatibility with the culture it joins; or practicality of innovation or ease of understanding by people to whom it is offered; or satisfaction or reward; or utility and prestige it brings.

The most comprehensive work in the area of innovation is that done by Barnett (1953). Barnett sees the sponsorship of an innovation as only one component of the acceptance situation. Although it may be the critical factor in influencing others, it is not seen as functioning in isolation. A change-agent always supports some specific innovation; however, the precise nature of the innovation is as important to a potential acceptor as is the background, the attitude, and the personality of its sponsor. Characteristics of innovations that have a bearing on this problem fall into two categories: (1) Features which are inherent in the innovation itself: features envisaged by the potential acceptor give an innovation significance for the acceptor in terms of his background; and the understanding that he has of an innovation, in light of his background, either gives or fails to give it a particular appeal and a place in his behavioural system. Though not completely independent of the general environment, these features are of an intrinsic nature because they result from the syncretism of the individual's general background and his experiences in relation to this background. These intrinsic features or attributes are therefore of a mental order. (2) Features which have to do with the feasibility of adopting the innovation into the current environment providing it is in itself acceptable to the potential acceptor. This consideration is of another order, an experiential order, because it is extrinsic to the perceived nature of the innovation.

Barnett (1953) in his excellent treatise on innovation identifies and elaborates on, with a great deal of detail, the following attributes: compatibility, efficiency, cost, advantage, pleasure or hedonistic consideration, mastery, penalty, repercussions.

More recent studies have tended to support the earlier findings of social scientists. Menzel (1960) carried out a penetrating analysis of several attributes of innovations in the field of medicine in order to find criteria for classifying innovations in cultural systems. From his survey of historical literature he found the best known attributes of innovations to be communicability and pervasiveness of consequences. To these two he added degree of risk involved in adoption of a given innovation and recency of its origin, meaning uncertainty and ignorance regarding the new practice.

Rogers (1962, p. 125) reports on a recent study by Wilkening and others that shows clearly that farmers perceive differences among practices on several attributes, but the effect of these differences on adoption behavior is not reported. Based on past writings and research, Rogers (1962, p. 124) has selected five characteristics for elaboration. But he emphasizes the need for a "comprehensive set of characteristics of innovations which are as mutually exclusive and as universally relevant as possible." The five characteristics of innovations Rogers selected are (1) relative advantage, (2) compatibility, (3) complexity, (4) divisibility, and (5) communicability.

Though they point out that nobody is quite sure what dimensions of an innovation are relevant, Katz, Levin, and Hamilton (1963) cite such attributes of innovations as their cost, profitability, communicability, the degree of risk involved in acceptance, compatibility, and pervasiveness.

Although LaPiere (1965, p. 204) regards the diffusion of innovation research as largely irrelevant to the study of social change he speaks of a new product winning its way "on its own intrinsic merits." He further uses the notions of incongruency, pervasiveness, risk, penalty, advantage, and complexity when discussing potential innovative endeavor. It is interesting to note that he thinks of innovating as the creation of a unique and to a significant degree unprecedented mental construct, the idea that makes possible the "thing" (p. 107).

Fliegel and Kivlin (1966) in their rural sociology study of attributes of innovations as factors in diffusion selected fifteen attributes from their survey of the literature. The attributes selected were:

1. Initial Cost.
2. Continuing cost.
3. Rate of cost recovery.
4. Payoff.
5. Social approval.
6. Saving of time.
7. Saving of discomfort.
8. Regularity of reward.
9. Divisibility for trial.
10. Complexity.
11. Clarity of results.
12. Compatibility.
13. Association with dairying.
14. Mechanical attraction.
15. Pervasiveness.

In relation to education, Brickell (1969, p. 290) asks the question: "Will it be adopted, or will it not?" The decision being on an advance "evaluation," which estimates how the new program would fit into and affect the school itself and estimates how it would affect student learning.

Along with some similar characteristics to those already identified by other researchers, he also identifies the characteristic of "cost" (p. 292). Cost is broken down into three component parts: initial costs, installation costs and continuing costs. For the purposes of this study initial cost and installation costs are considered one. He further identifies administration attitudes and faculty attitudes as being relevant factors in accepting an innovation (p. 300).

The Awareness Stage of the Adoption Process

For many reasons, it seemed most reasonable to use Rogers' adoption process theory (1962) for this study. In the first place, it was necessary to have a theory that examined innovation from the vantage point of the individual who is called upon to innovate and not from the vantage point of an advocate or "change-agent." Then, it was important to have a theory solidly based on empirical studies. This one is, more so than many of the others. Most of Rogers' concepts come from his examination of more than five hundred research studies of innovations in agriculture, medicine, and education. With this empirical base, Rogers' work is amenable to testing. Finally, his concepts are generalizable to education.

Rogers' (1962, p. 305) adoption theory contains three major divisions: (1) antecedents, (2) process, and (3) results. The concern of this

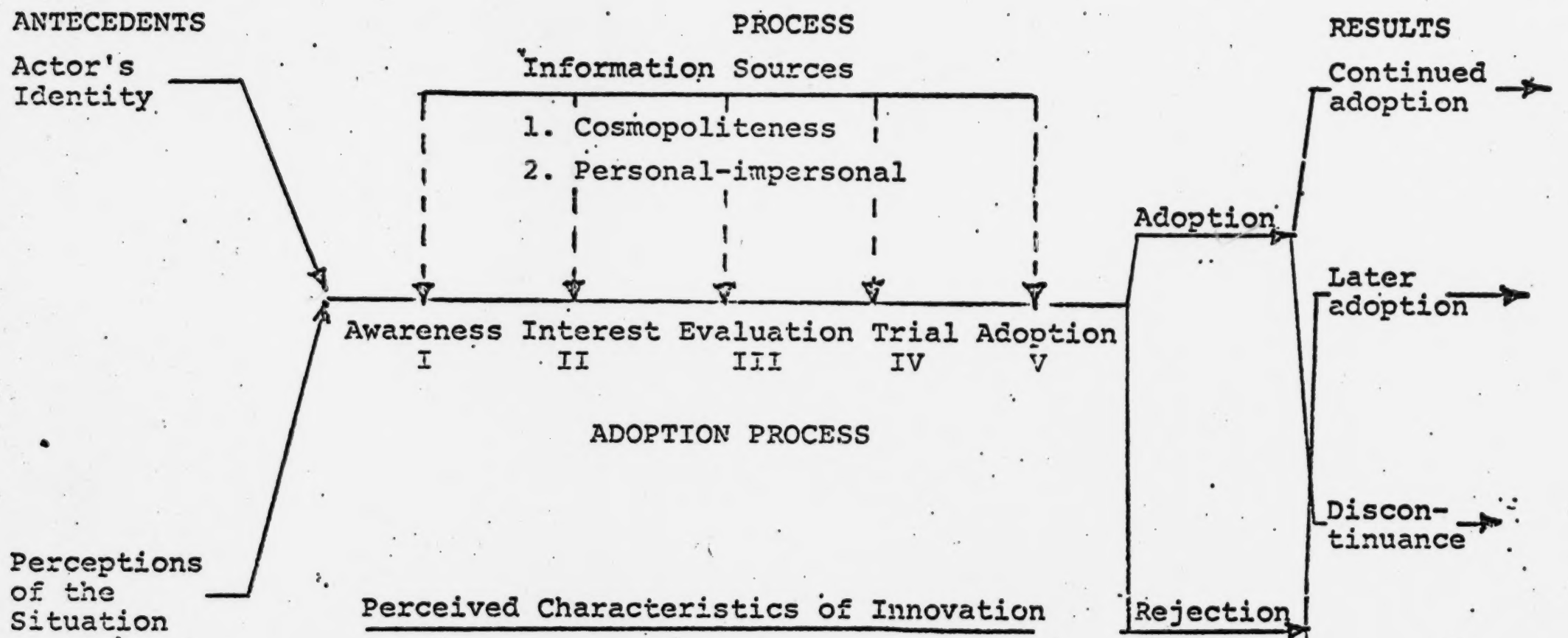

Figure 1.

Paradigm of the Adoption of an Innovation

(from Rogers, Diffusion of Innovations

study is with process (Figure 1). In the adoption process Rogers claims every individual passes through five stages in adopting a new idea.

1. The Awareness Stage. During this stage an individual or group may be exposed to a new idea without being exposed to complete details.

2. The Interest Stage. During this stage the individual or group has indicated some interest in the innovation and seek more information about it.

3. The Evaluation Stage. During this stage the individual mentally applies the innovation and decides whether or not to try it.

4. The Trial Stage. During the trial stage the innovation is used on a small scale.

5. The Adoption Stage. At this stage the decision is made whether or not to continue the innovation in full and continued use.

The concern of this study is with the awareness stage of the adoption theory. "Most researchers have implicitly conceptualized the awareness stage as a random or nonpurposive occurrence (Rogers, 1962, p. 82)." An individual may seem to become aware of an innovation quite by accident. However, Hassinger as quoted in Rogers (1962, p. 82), criticized the assumption of nonpurposiveness of the awareness stage. He argues that awareness must be initiated by the individual and is not a passive act.

Rogers (1962, p. 82) points out that perhaps one is faced with the chicken and egg type of question. Does a need precede awareness of an innovation or does awareness of a new idea create a need for that innovation? Although clear research evidence cannot be found,

tentative evidence suggests the latter is more common.

Barnett (1953, p. 18) points out that:

> In innovation the fusion takes place on a mental plane. This means that the process and its result are something quite different from the union of the things themselves.

Man, as a thinking being, relates to innovation in his mind. In the mental process an innovator or acceptor seeks mental congruence for the new idea. This mental activity is a complex commingling of perception, cognition, recall, and affect (Barnett, 1953). If the innovator is successful in the mental process and he is able to establish a mental configuration--here the notion of configuration replaces the concept of thing--using the new idea, then he has been successful in establishing mental congruence. The innovator has now accepted the new idea in principle. If, on the other hand, the innovator has not been successful in establishing a mental configuration using the new idea he will reject or not accept it.

Acceptance of the new idea in principle allows the acceptor to work toward adoption of the new idea as represented by his mental configuration. The physical process of adoption involves trial of the new idea in its original mental configuration or subsequent configurations. Such activity may result in combinations of configurations being organized into a larger configuration. Thus the physical process is the attempt to provide experiential congruence in order that the new idea is activated in a physical setting. If this process is successful adoption of the new idea usually occurs. This process may be thought of as occurring on two levels: first, as a mental process and second as a physical act.

applicable to acceptance. For example, the conditions that are conducive to innovation also stimulate acceptance. Cultural anticipation of change is also favourable to the acceptance of new ideas. Frequently, the motivations and the characteristics of acceptors of innovations are much the same as those of innovators. Furthermore, the boundaries of an innovation establish the areas of controversy about accepting them. Finally, it is to be noted that acceptance can take two courses and that the conditions for their functioning are traditionally defined (Barnett, 1953, p. 49). In one case the purpose of the acceptor is to imitate some alien form, thus producing a copy; in the other the acceptor attempts a compromise between the alien form and one of his own, thus initiating a syncretism. In both instances there is a conjunction of differences, and in both something new is produced. In either case, acceptance is a form of imitation which produces a modification of the prototype (even though the copyist may make a diligent effort to be faithful to his model).

This means that imitation is inevitably innovative, and acceptance is also. However, this is not to say that the two phenomena of innovation and acceptance are not distinct and that they may have different determinants even though the problems of the two join at many points. In summary, acceptance is thought to operate within the same perceptual and conceptual framework as does innovation.

> Everything else may indeed be different--the motivations, the conditions and the precise date; but the processes, the mental mechanisms, are repeated with each individual case of acceptance, beginning with the innovator himself, who is only a

> special, the first, acceptor of the novelty. As far as thought processes at the instant of conception or acceptance are concerned, innovation and acceptance reveal no distinctions . . . It is also why it must be granted that acceptors, by the act of acceptance, are innovators, regardless of the fact that they build upon a recognized break with tradition rather than upon some aspect of it (Barnett, 1953, p. 330).

Barnett draws on the work of Kroeber (1940, p. 1) to explain how the concept of stimulus diffusion recognizes the innovative character of acceptance. From this concept all diffusion is seen as stimulus diffusion when the acceptance of a new idea is understood as a mental process of the acceptor and not as a logical construct to explain resemblances. Hence all acceptance is diffusion.

The Hypotheses

On the basis of these theoretical considerations it was hypothesized that (1) it should be possible to select the best predictors for acceptance of innovations from among the set of attribute variables and, (2) attributes will tend to cluster and allow for categorization under specific factor headings.

THE EXPERIMENTAL DESIGN

The design of this study consisted of two distinct phases: the planning phase in which conflicting needs and possibilities were weighed and considered and finally resolved, and the testing phase in which the experimental design was carried out.

The planning phase of this study was considered in two parts: the five major design problems and the collection of data.

Planning Phase

The Five Major Design Problems

Using the design study suggested by Fliegel and Kivlin (1966, p. 236), the first problem was that of controlling for the effects of social, personal, and situational factors known to have an impact on the diffusion process in order to concentrate on the perceived attributes of innovations and the variability among innovations. To do this an ideal situation was created where teachers hypothetically were given the opportunity to accept or reject proposed innovations. The procedure was to give teachers a representative number of simply described innovations and ask them to rate each innovation using an attached attribute scale. Thus a perceived attribute rating was obtained for each innovation.

The second problem was related to the expressed desirability of a research focus on determining which aspects of attributes of innovations might be relevant. This was done in part "by taking into account as many as possible of the relevant attributes of innovations" (Fliegel and

Kivlin, 1966, p. 237). It was necessary to seek out all possible attributes that might accrue to innovations. This was done from the literature cited in the theory.

From those contributions a total of twenty-six attributes were first considered. This number was systematically reduced to sixteen by the investigator using the criterion of similarity of attributes, judgment of colleagues and field testing of the rating scale. The sixteen attributes are listed in Table I.

Having minimized variation in the external factors which were thought to affect the diffusion process, and after having selected certain features of the innovation for study, it was also found desirable, to maximize variability in the focal area by including as many innovations as possible in the research design. To determine what innovations to use in the study it was necessary to select a wide range of educational innovations, ones which can be described for teacher understanding, and reduce these to a realistic, but representative number. For the purposes of this study there were eighteen innovations relating the teaching-learning process and school organization. The innovations used are listed in Table II.

In the present study, it was decided to focus on the subjective approach, to try to obtain an estimate of the teacher's perceptions, on the grounds that as Rogers (1962) puts it, it matters little whether or not an innovation has a great degree of advantage over the idea it is replacing, but rather what does matter is whether the individual perceives the relative advantage of the innovation. Each of sixteen attributes were operationalized in terms of a five-point Likert-type scale to reflect the degree of possession of the attribute.

A given respondent rated each of the eighteen innovations on each of the sixteen attribute scales. The result was an individual teacher measure for each of the innovations on every attribute. The results were combined and averaged to obtain a mean attribute rating.

The final design problem consisted of working out a method of considering the effects of each attribute in the context of other relevant attributes, since presumably no single attribute completely describes a given innovation. In other words, if a given innovation was viewed as a thing or idea which has several attributes, and if these several attributes were hypothesized to influence the acceptance of that innovation, then, the tests of such hypotheses must take into account the interrelationships among the various attributes.

Multiple regression procedure was used to isolate the effect of any given attribute on the rate of acceptance while taking into account the effects of all the others.

The Sample and the Collection of Data

The sample consisted of 337 teachers in five large urban systems. The grades represented were Kindergarten through grade thirteen.

Information concerning perceived attributes of innovations was collected using a Likert-type rating scale. As previously described the attribute rating scale consisted of sixteen attribute items representing the independent variables, and two dependent variables consisting of Acceptance and Experience. The eighteen innovations were rated using this scale.

Scoring the Attribute Scale and Analyzing the Data

Responses on the five point scales were weighted using the usual 1 to 5 value method. The scores of the items were summed and averaged to yield a teachers' perceived attribute score. The purpose of the summated rating procedure was to place the teachers somewhere on an agreement continuum for each of the attribute items.

The dependent variables, Acceptance and Experience, were scored in a similar manner. Experience was included in the scale to control for the influence which direct experience might have on the perceived acceptance of that innovation.

It was assumed that the sixteen attributes given would overlap in measuring the perception of the participating teachers. It would seem likely that much of what was measured by the sixteen attributes could be understood in terms of a smaller number of underlying factors. This was the approach of Ramstad (1963, p. 13) in dealing with similar material.

A statistical method, principal component analysis, was utilized in which a matrix of intercorrelations was systematically analyzed and more succinctly described in terms of a reduced matrix of loadings on major factors.

Specifically, the coefficients of correlation of the various attributes were computed by an electronic computer. These coefficients were then arranged into a matrix form.

The data were further analyzed using a multiple regression program from the Triangular Regression Package designed by Bjerring, Dempster and Hall (1969). This program provided the best predictors from among the sixteen variables used in the study. This procedure was recommended by Garrett (1966) as being particularly useful in handling these kinds of data.

TABLE I

F PROBABILITIES FOR MULTIPLE CORRELATION DATA INDICATING THE SIGNIFICANT ATTRIBUTES ACCRUING TO EACH OF THE EIGHTEEN INNOVATIONS

N = 337

INNOVATIONS	ATTRIBUTES																
	1 Clarity of Results	2 Initial Cost	3 Reper-cussions	4 Div. of Trial	5 Novelty	6 Assoc'n with Teaching	7 Complexity	8 Pleasure	9 Perva-siveness	10 Colleague Approval	11 Efficiency	12 Advantage	13 Cont'g. Cost	14 Compat-ibility	15 Admin. Approval	16 Penalty	? Var
1. Building Flexibility	.001					.01		.01			.0000		.0004	.005			5
2. Teacher Aides			.02				.02	.0004			.0000	.0003					5
3. Data Processing	.0000					.001		.0002			.001			.02			5
4. Ungraded System	.0000						.05	.0001		.05	.0000	.0000		.05			6
5. Instructional System Prototype	.001					.001		.0003		.04	.0000	.005	.01	.0003		.03	6
6. Electronic Study Carrels	.001					.001			.04		.0000	.05		.01	.05	.03	6
7. Small Group Instruction	.0001		.001			.01		.05			.0000			.003		.01	6
8. Large Group Instruction	.002					.04		.0002			.0000	.001		.02		.03	7
9. Team Teaching	.02						.03	.0001			.0000	.001					6
10. Teaching Assistants	.0000							.0002			.0000	.02					7
11. Inductive Teaching	.0001					.002		.01			.0000			.01	.02		6
12 Learning Resource Center	.0000										.0000	.0001		.01			5
13. Closed Circuit Television	.0000					.0000		.01			.0000			.04	.003		7
14. Independent Inquiry	.0000					.002		.007			.0000	.0004		.01			7
15. Laboratories	.0000	.01						.03			.0000	.0001					6
16. Programmed Texts								.001			.0000	.001			.02		6
17. Simulation	.005					.004		.001			.0000			.01		.04	6
18. 8mm. Single Concept Films	.002					.002					.0000				.01	.02	6

THE FINDINGS

Table I provides a summary of the significant predictors for each innovation. The procedure, by means of regression analysis, was to determine what F ratios were significant at the .05 level or beyond.

The first research hypothesis, that it should be possible to select the best predictors for acceptance of innovations from among the set of attribute variables, is therefore accepted.

In addition to support for the hypothesis, the data shown in Table I provide some interesting information with respect to which attributes are most commonly perceived to be significant. Efficiency proved to be the most highly significant of the sixteen attributes.

In all cases Efficiency was significant in a positive direction indicating a concern over how well any one of the innovations might work in the respondents' situations. It must not be construed that all the innovations were accepted because of their perceived efficiency, but rather that efficiency is perceived as the single most important attribute looked for in acceptance of these innovations. This might be generalizable to all innovations.

At the other extreme, the sensitivity of perceived acceptance hinged on specific attributes such as the perceived Initial Cost of Laboratories and the Pervasiveness of Electronic Study Carrels. Divisibility and Novelty were not perceived as being significant to acceptance of any of the innovations. However, it was later found that Divisibility was a descriptive name for a cluster of attributes constituting a major factor. Novelty on the other hand was shown to be a feature of Complexity.

TABLE II

NORMAL VARIMAX FACTORS RELATING TO THE EIGHTEEN INNOVATIONS

N = 337

INNOVATIONS	FACTORS					
	I Complexity	II Relative Advantage	III Divisibility	IV Communic-ability	V Compat-ability	% of total Variance
1. Building Flexibility	X	X	X	X	X	60.6
2. Teacher Aides	X	X	X		X	58.2
3. Data Processing	X	X	X	X	X	67.5
4. Ungraded System	X	X	X	X		59.6
5. Instructional System Prototype	X	X	X		X	63.4
6. Electronic Study Carrels	X		X	X	X	60.3
7. Small Group Instruction	X	X	X			67.8
8. Large Group Instruction	X	X	X	X	X	59.5
9. Team Teaching	X	X	X	X		62.8
10. Teaching Assistants	X	X	X	X	X	63.4
11. Inductive Teaching	X	X		X	X	63.1
12. Learning Resource Center	X	X	X	X	X	65.0
13. Closed Circuit Television	X	X	X	X	X	67.8
14. Independent Inquiry	X	X	X	X	X	68.4
15. Laboratories	X	X	X	X	X	60.7
16. Programmed Texts	X	X	X	X	X	63.2
17. Simulation	X	X	X	X		70.8
18. 8 mm. Single Concept Films	X	X	X	X		61.5

Table II shows that the second research hypothesis, that attributes will tend to cluster and allow for categorization under specific factor headings, is accepted.

Following the suggestion of Harman (1967, p. 133) the magnitude of the factor weights guided the selection of the appropriate names for the factors. The names selected were usually suggested by the nature of the variables having the largest correlations with the factor under consideration. The names were also consistent with the nature of the remaining variables which had low correlations with the factor.

Generally speaking Harman's advice was also heeded when he suggested that ". . . it takes at least three variables to define a factor." (1967, p. 134)

In addition to general support for the hypothesis, the data shown in Table II provide support for the part of Roger's theory which conceptualizes the perceived characteristics of innovation as Relative Advantage, Compatibility, Complexity, Divisibility, and Communicability.

It would also appear that the five factor solution provides the "best" description of the attributes tapped by the attribute rating scale.

IMPLICATIONS

Implications for Change Theory

The findings of this study have a number of implications for change theory. It is usually assumed for example, in the implementation of change that external factors, personal, social, and situational are of major importance. In this setting the intrinsic features of the innovation are not taken into account. The fact that the perceptions of teachers of the attributes of innovations are significant should be a matter of some interest for the builders of change theory. The implications of this finding are further supported by the significance given the perceived characteristics found in Roger's Adoption Process Theory. Furthermore, as this study was carried out at the awareness stage of Roger's process theory it provides credence for Barnett's (1952) notion that innovation is a "mental process".

Implications for Practice

The present study has a number of implications for the educational change advocate. Probably the most obvious need is for the advocate to become sensitive to the fact that teachers may have already made up their minds about a new idea or thing prior to implementation. All external factors may have been well taken care of in preparation for implementation, but the "target" teachers may have found the new idea or thing unacceptable at the point at which they first became aware of it. This would imply that the advocate must prepare his target for acceptance much earlier than has been the custom. Subsequently, the advocate must have some

means of knowing how the "target" teachers might initially perceive a new idea or thing at the point they become aware of it.

Prior knowledge of perceived attributes should make it possible to put innovations on some common footing in order to generalize across innovations.

Implications for Research

The results of the present study pose a number of challenging questions for persons interested in change theory. First, could this approach rectify the partial failure of previous educational research to take into account similarities and differences among innovations? Now it is problematic at best to generalize from the known determinants of adoption of a given innovation to a second or third innovation. Second, if innovation is a mental process, does this provide a clue to a further understanding of creativity? Third, is innovation really a two level process: a mental process of conceptualization at the awareness stage and a physical act of implementation at the adoption stage?

CONCLUSIONS

It is probable that the shortage of research concerned with internal factors accruing to innovations stems, at least in part, from the considerable complexity of the research task. In general this study may provide a means for further study of this other dimension of innovation. The evidence presented here shows that attributes accruing to innovations are perhaps as relevant to implementation of innovations as are external factors. How a teacher perceives a new idea or thing being as important as the thing or idea itself.

It would seem that there is reasonable support for the notion that innovation is initially a mental process followed by a physical act of implementation. The relationship proposed here is an interdependent one. The direction of innovation being from acceptance at the awareness stage to implementation at the adoption stage.

In terms of its practicality this study appears to present a framework to put educational innovations on some common footing in order that we may generalize across innovations.

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